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CONSERVING VICTORY GARDEN PRODUCTS

CONSERVING VICTORY GARDEN PRODUCTS AND THEIR CHIEF NUTRITIONAL VALUES

by

Warren B. Mack, Executive Secretary
Advisory Victory Garden Committee
R. Adams Dutcher, Chairman
Sub-Committee on Conservation of Victory Garden Products
Pauline Beery Mack, Chairman
Sub-Committee on Nutrition
Advisory Victory Garden Committee
State Council of Defense
Commonwealth of Pennsylvania

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COMMONWEALTH OF PENNSYLVANIA

STATE COUNCIL OF DEFENSE

TO: County and Local Victory Garden Committees

FROM: Warren B Mack, Executive Secretary, Advisory Victory Garden Committee; R Adams Dutcher, Chairman, Sub-Committee on Conservation of Victory Garden Products; and Pauline Berry Mack, Chairman, Sub-Committee on Nutritional Requirements of Pennsylvania Families

SUBJECT:

CONSERVATION OF VICTORY GARDEN PRODUCTS AND THEIR NUTRITIVE VALUES

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CONSERVATION OF VICTORY GARDEN PRODUCTS AND THEIR CHIEF NUTRITIVE VALUES

Consistent with the principal objective of the Victory Garden program, to improve national health, morale, and efficiency through increased home production of vegetables and fruits and their wider use in the diet, emphasis is being placed on the conservation of all home garden products as well as the preservation at home of commercial vegetables and fruits which may be abundant or surplus in the markets, and which are suitable for home preservation   This brief outline seeks to present in convenient form the methods of conserving the various products commonly grown in Pennsylvania, which are practical under present conditions, and which will retain to the fullest possible extent the most important nutrient values as well as the characteristic flavor and quality of each vegetable or fruit

Nutrients which should be Emphasized Most in the Pennsylvania Dietary

The mass studies in human nutrition which have been carried on in Pennsylvania during the past eight years show that the majority of the dietaries in this state are not so satisfactory as they should be in their content of the following nutrients:

Protein
Calcium
Iron
Vitamin A
Vitamin B_1 (Thiamin)
Vitamin B_2 (Riboflavin)
Niacin
Vitamin C

It is quite as important that these nutrients be considered in choosing foods for conservation for next winter's use as to have considered them in planting the Victory Garden

Here are the outstanding vegetables which will make contributions to these respective nutrients, arranged in order from the highest to the lowest:

Protein

Beans, soy, dried
Peas, dried, split
Lentils, dried
Peas, dried, whole
Beans, navy, pea bean,
 kidney pinto, and others
Beans, lima, dried
Beans, soy, fresh
Beans, soy, sprouts
Beans, lima, fresh
Peas, fresh, shelled

Calcium

Cabbage, loose outer leaves
Broccoli leaves
Turnip greens
Mustard greens
Collards
Kale
Broccoli
Onions, young, green
Dandelion greens
Rutabagas
Celery stalks

Calcium continued

Leeks
Parsnips
Carrots
Escarole
Endive
Potatoes
Cauliflower
Lettuce, green

Iron

Mustard greens
Turnip greens
Spinach
Beet greens
Swiss chard
Dandelion greens
Kale
Cabbage, fresh leaf
Potatoes, white
Onions, young green
Endive, curled
Escarole
Carrots
Leeks
Cabbage, head
Lettuce, green

Vitamin A

Spinach
Beet greens
Dock or Sorrel
Kale
Mustard greens
Lambsquarters
Turnip greens
Dandelion greens
Escarole
Broccoli
Carrots
Parsley
Collards
Squash, winter
Endive or Chickory
Onions, young green
Lettuce, green

Vitamin B_1 (Thiamin)

Beans, soy, fresh
Beans, soy, dried
Peas, fresh
Beans, lima, fresh
Collards
Dandelions
Potatoes, white
Turnip greens
Beans, lima, dried
Kale
Beans, navy, kidney, pinto and others
Corn, sweet, yellow
Mustard greens
Spinach
Broccoli
Cabbage, fresh leaf
Turnips, white

Vitamin B_2 (Riboflavin)

Turnip greens
Beet greens
Kale
Mustard greens
Beans, navy, kidney, pinto
Spinach
Beans, lima, fresh
Collards
Soy beans, fresh
Beans, lima dried
Soy beans, dried
Dandelions
Broccoli
Peas, fresh
Cauliflower
Lettuce, green
Lettuce, iceberg
Beans, soy, fresh
Spinach, fresh
Potatoes, white
Pepper, green

Vitamin C (Ascorbic Acid)

Mustard greens
Pepper, green
Cabbage, green
Turnip, white
Tomato, red
Cabbage, Chinese
Turnip greens
Spinach
Potato, white

Vitamin C (Ascorbic Acid) continued

Onions, young green	Water cress
Endive, curled	Carrots

The lists given contain vegetables only, not fruits. In Table I pages(5-6)the chief contributions of major fruits and vegetables are given. Likewise more extensive tables of food values of fruits and vegetables, and more information about nutritional needs of human beings may be found in a bulletin: Vegetables and Fruits in Relation to Human Nutrition in Wartime, Ellen H Richards Institute, General Series Publication Number 1, The Pennsylvania State College

Methods of Conserving or Keeping Vegetables and Fruits

The most common and practical methods of holding garden products for future use, together with their influence on the retention of the various nutrients contained in vegetables and fruits, are the following:

1 Storing in cool cellar, cave, pit, or other storehouse Only the kinds of fruits and vegetables which develop relatively slowly may be held for any considerable period Losses of carbohydrates, fats or oils, proteins, vitamin A, and vitamin C occur, less if the storage temperature is low, more if it is higher. At lower temperatures, changes of flavor of greater or lesser consequence may take place.

2 Canning in sealed glass jars preserves almost any fruit or vegetable for an indefinite period. About the only loss is that of vitamin C, which varies from almost all, in non-acid vegetables, to very little, in acid fruits packed after brief pre-cooking to drive out air. Color and flavor may be changed by canning, particularly in non-acid vegetables

3 Drying, evaporating, or dehydrating causes loss of vitamin C particularly, and also to a lesser extent of vitamins A and B_1 unless the product is properly steamed or blanched before drying Flavor and color also are changed unless vegetables are blanched Products may be damaged by insects if these are not excluded, and by molds unless kept in a dry place Because flavors of many dried vegetables are different from those of the fresh or canned products, home conservers of food should be certain that dried products are acceptable to the family before processing any considerable quantity in this way.

4 Freezing rapidly after proper preliminary treatment (blanching, slicing, or sugaring as the product may require) conserves practically all of the nutrients

5. Brining and fermenting result in considerable losses of vitamin C and vitamin A: some of the sugars are converted to acid, which is the preservative agent.

6. Pickling by cooking with vinegar or other acid material and sealing in metal or glass containers reduces the loss of vitamin C which ordinarily takes place in canning. Little is known about its effects on other vitamins.

7. Preserving with large proportions of cane sugar is not possible at present except with sirups other than cane sugar sirup.

TABLE I

Principal Nutrient Value (1) and Recommended Conserving Method for Each of the Common Vegetables and Fruits

Fruit or Vegetable	Principal Nutrient Value	Recommended Method of Conserving	Other Acceptable Methods of Conserving
Apples, summer	Energy, vitamins A, B_1, B_2, and niacin	Canning as sauce	Drying
Apples, winter		Storage	Drying, Canning
Apricot	Energy, vitamins A, B_1,B_2	Canning	Drying
Asparagus	Vitamins A, B_1, B_2	Pressure Canning	Tips may be dehydrated
Bean, fresh lima and shell (2)	Protein, energy, vitamins B_1, B_2, C	Freezing, pressure canning	Drying
Bean, snap	Vitamins A, B_1, B_2	Pressure Canning Dehydrating	Freezing
Bean, soy, fresh (2)	Protein, energy, vitamins A,B_1,B_2,C, niacin	Pressure canning, drying	
Beet	Vitamins A, B_1, B_2	Storing, pickling	Pressure canning
Berries	Energy, Vitamin A	Canning, drying	
Broccoli	Vitamins A, B_1, B_2, C	Freezing	Dehydrating
Cabbage	Vitamins B_1, B_2, C	Storing, sauerkraut	
Cabbage,Chinese	Vitamins A, B_1, B_2, C	Storing	
Carrot	Energy, Vitamins A, B_1, and B_2	Storing	Pressure canning, dehydrating
Cauliflower	Vitamins B_1, B_2, C	Storing	
Celery	Vitamins A, B_1, B_2,flavor	Storing	Dehydrating (for flavoring)
Cherry	Energy, Vitamins A, B_1	Canning	Freezing (sour)
Corn, sweet	Energy, vitamins A,B_1,B_2	Pressure canning Dehydrating	
Cucumbers	Vitamins B_1, B_2	Pickling, brining	
Currants	Energy, vitamins A,B_1,C	Jellies, Jams	Drying
Eggplant	Vitamins A, B_1	No satisfactory storage	
Endive	Vitamins A, B_1, B_2	Storing	

(1) Excluding minerals which are not affected by storage methods.
(2) Mature beans are stored dry.

TABLE I (continued)

Principal Nutrient Value (1) and Recommended Conserving Method for Each of the Common Vegetables and Fruits

Fruit or Vegetable	Principal Nutrient Value	Recommended Method of Conserving	Other Acceptable Methods of Conserving
Gooseberry	Energy, vitamins A, B_1, C	Canning, jam	
Greens	Vitamins A, B_1, B_2, C	Freezing, Dehydrating	Pressure Canning
Herbs	Flavor, vitamins A, B_1, B_2	Drying	
Kale	Vitamins A, B_1, B_2, C	Storage	Dehydrating
Leek	Vitamin B_1, Flavor	Storage	Dehydrating
Lettuce	Vitamins A, B_2	No satisfactory storage	
Mushroom	Vitamin B_1, Flavor	Pressure canning	Dehydrating
Muskmelon	Energy, Vitamins A, B_1, B_2	No satisfactory storage	
Okra	Vitamin A, B_1	Pressure canning Dehydrating	
Onion	Energy, flavor, vitamins, B_1, B_2	Storage	Dehydrating (for flavoring)
Pea, green	Protein, energy, vitamins A, B_1, B_2, C	Freezing Pressure canning	Dehydrating
Peach	Energy, vitamins A, B_1, B_2	Canning, freezing	Drying
Pear (3)	Energy, vitamins B_1, B_2	Canning	Drying
Pepper, hot	Flavor, vitamins A, B_1, B_2, C	Drying	
Pepper, sweet	Vitamins, A, B_1, B_2, C, Niacin	Pickling	Dehydrating
Plum	Energy, vitamins B_1, B_2	Canning	Dehydrating
Potato	Energy, niacin, vitamins B_1, B_2	Storage	
Pumpkin	Energy, vitamins A, B_1, B_2	Storage, Pressure canning	Freezing, Dehydrating
Radish	Flavor, vitamins B_1, B_2, C	Storage winter varieties only	
Rhubarb	Energy, vitamins A, B_1	Canning	Dehydrating
Rutabaga	Energy, vitamins B_1, B_2, C	Storage	
Spinach	Vitamins, A, B_1, B_2, C, niacin	Freezing, Dehydrating	Pressure Canning
Squash, summer	Energy, vitamins B_1, C	No satisfactory storage	
Squash, winter	Energy, vitamins A, B_1, B_2	Storage, Pressure Canning	Freezing, Dehydrating
Sweet potato	Energy, vitamins A, B_1, B_2	Storage	Pressure canning, Dehydrating
Tomato	Vitamins, A, B_1, B_2, C	Canning	
Turnip	Energy, vitamins B_1, B_2, C	Storage	
Watermelon	Vitamins A, B_1, B_2	No satisfactory storage; rinds may be pickled	

(1) Excluding minerals which are not affected by storage methods. (3) Winter varieties may be stored.

Harvesting of Garden Products for Conserving

In general, garden products which are to be conserved by canning, freezing, drying, or dehydrating should be harvested at the best stage for eating immediately, and should be prepared for processing, and processed as rapidly as possible. If such preparation requires much more than an hour or so, the crop should be gathered piecemeal, though best quality generally is obtained during the forenoon, or before slight wilting of leaves takes place, as often happens on hot afternoons. For storage in cool or cold cellars, caves, trenches, or pits, products will keep better if they are harvested when fully developed, and in the case of fruits, fully colored, but before they have begun to soften or before they have fully matured.

Only sound, unbruised products free from disease should be placed in cool or cold storage. Only good quality fruits and vegetables should be conserved by any method Canning, drying, and freezing will not produce a good product unless the material was good to begin with.

For cool or cold storage of raw products, the products generally are prepared as for market, though they are not so closely trimmed as a rule. For example, a few more leaves are left on cabbage, a few more stalks on celery, and somewhat more of the top is left on root crops such as turnips, rutabagas, beets, and carrots, than would be on the respective vegetables as prepared for marketing directly.

For canning, freezing, pickling, fermenting, or dehydrating, fruits and vegetables generally are prepared as they would be for immediate cooking and eating.

Fruits may be canned or frozen without sugar, though they retain color, shape, and size more fully during canning if some sugar is used; if no sugar or sirup is added before freezing, some should be placed on the fruit as it is thawed. Salt is added to vegetables before canning, at the rate of one teaspoonful to the quart. Canning powders should not be used.

Canning Fruits and Vegetables

Complete and very helpful instructions on home canning may be found in Farmers' Bulletin No. 1762, Home Canning of Fruits, Vegetables, and Meats, which may be obtained by individuals from the Office of Information, United States, Department of Agriculture, Washington, D C., free as long as the supply in this office lasts; thereafter, they may be obtained for five cents a copy from the Superintendent of Documents, Government Printing Office, Washington, D. C. (Congressmen usually have a supply of Government publications, which they furnish free on request to constituents).

Other publications from the same sources, of value to home producers and conservers of fruits and vegetables are Farmers' Bulletin No. 879, Home Storage of Vegetables; Farmers' Bulletin No. 900, Home-made Fruit Butters; Farmers' Bulletin No. 984, Farm and Home Drying of Fruits and Vegetables; and Farmers' Bulletin No. 1438, Making Fermented Pickles.

For timely information on the same subjects consult your county agricultural or home economics extension representative or write to the Agricultural Extension Service, The Pennsylvania State College.

Fruits - The following table, taken from Farmers' Bulletin No. 1762, summarizes briefly the procedures in canning fruits, tomatoes, and acid foods. As suggested above, fruits should be fully ripe for canning as a rule, though it is not desirable that they be too soft. If fruits are canned without sugar, juicy ones such as berries, cherries, plums, and grapes should be canned in their own juices; less juicy fruits, such as apples, peaches, and pears require some added water, though the least necessary amount should be used. Fruits packed without peeling, such as plums and cherries, should be punctured to prevent bursting. Products are pre-cooked until tender and packed boiling hot, or are packed cold and covered with boiling sirup as indicated.

TABLE II

Timetable for Processing Fruits, Tomatoes, and Other Acid Foods

Times are given for places with altitudes up to 1000 feet; for each additional 1000 feet, increase time by one fifth.

Fruit	Style of Pack	Processing Time in boiling water for pint or quart glass jars
Apples	Steamed or boiled to wilt, packed in hot sirup or water Apple sauce, packed hot	15 minutes 5 minutes
Apricots	Packed raw, covered with hot sirup Precooked and packed hot	25 minutes 15 minutes
Beets, pickled	Precooked, peeled, sliced, and packed hot	30 minutes
Berries (except strawberries)	Packed raw, covered with hot sirup Precooked and packed hot	20 minutes 5 minutes

TABLE II (continued)

Timetable for Processing Fruits, Tomatoes, and Other Acid Foods

Times are given for places with altitudes up to 1000 feet; for each additional 1000 feet, increase time by one fifth.

Fruit	Style of Pack	Processing Time in boiling water for pint or quart glass jars
Cherries	Packed raw, covered with hot sirup Precooked and packed hot	25 minutes 5 minutes
Currants	Precooked and packed hot	5 minutes
Gooseberries	Packed raw, covered with hot sirup Precooked and packed hot	20 minutes 5 minutes
Peaches	Packed raw, covered with hot sirup Precooked and packed hot	25 for soft, 35 for firm 5 minutes
Pears	Precooked and packed hot	20 minutes
Pineapples	Packed raw, covered with hot sirup	30 minutes
Plums	Packed raw, covered with hot sirup Precooked and packed hot	20 minutes 5 minutes
Rhubarb	Cut in 1-inch lengths, precooked and packed hot	5 minutes
Sauerkraut	Precooked and packed hot	25 minutes, pint 30 minutes, quart
Strawberries	Precooked with sugar and packed hot	5 minutes
Tomatoes	Packed raw Precooked and packed hot	45 minutes 5 minutes

Sirups are made by adding sugar to water and dissolving by warming and stirring. The proportions of sugar to water to make light, medium, and heavy sirups, and the fruits for which they are used are shown in the accompanying table.

TABLE III

Quantities of Sugar to One Gallon of Water for Different Densities of Sirup

Sirup	Sugar to 1 Gallon of Water				Percent of sugar or degree Balling
	By Measure		By weight		
	Cups (½ pint)	Quarts	lb.	oz.	
Light	5	1 1/4	2	2	20
Moderately light	8	2	3	10	30
	10	2½	4	8	35
Medium	13	3 1/4	5	9	40
	15½	3 7/8	6	13	45
Moderately heavy	19	4 3/4	8	6	50
	23 1/4	5 7/8	10	3	55
Heavy	28	7	12	8	60

Apples, pineapple - - - - - - - - - - - - - - light sirup
Peaches - - - - - - - - - - - - - - light or medium sirup
Berries, sweet cherries, currants, pears,
plums - medium sirup
Sour cherries, gooseberries, rhubarb - - - heavy sirup

Lighter sirups may be used than specified to conserve sugar. Strawberries and rhubarb may be cooked or baked with one-fourth their weight of sugar, instead of the heavy sirup ordinarily used for very sour products.

Vegetables - Non-acid vegetables, or those other than tomatoes, rhubarb, and pickled beets or cucumbers must be processed in a pressure cooker, at temperatures of 240 or 250° F., to be sure that all organisms which might cause spoilage are killed. To quote from United States Department of Agriculture Farmers' Bulletin 1762, "If a pressure canner is not available, then drying, brining, or some method of preparation other than canning should be used for these vegetables".

Vegetables, in general, are washed, trimmed, and cut, diced, or sliced as for cooking for immediate use. They are blanched or boiled from two to five minutes in water except small beets and carrots, or until heated through, and then are packed hot into jars, and covered with water in which they were boiled, with one teaspoon of salt to the quart, and jars are partially sealed. Beets and carrots are steamed for about 15 minutes, or until skins slip easily on the beets, then are peeled, packed into jars, covered with boiling water and salted with one teaspoon to the quart, and are partially sealed. All are processed at once in a pressure cooker, with pressures and times as shown in Table IV for altitudes up to 2000 feet. For higher altitudes, pressure is increased by 1 pound for each additional 2000 feet of elevation

TABLE IV

Timetable for Processing Non-acid Vegetables

Product	Pint Glass Jars		Quart Glass Jars	
	240°F. or 10 lb. pressure	250°F. or 15 lb. pressure	240°F. or 10 lb. pressure	250°F. or 15 lb. pressure
	minutes	minutes	minutes	minutes
Asparagus	30		35	
Beans, green lima	50		55	
Beans, snap	30		35	
Beans, soy	80		90	
Beets	30		35	
Carrots	30		35	
Corn, whole grain	60		70	
Corn, cream style		75		*
Greens, including spinach		60		65
Mushrooms	25		35	
Peas	45		*	
Pumpkin and squash		60		75

*Peas and cream style corn should not be packed in quart jars.

because of the overcooking necessary to insure against spoilage.

With glass jars partially sealed, the cooker should be allowed to cool until pressure has dropped to zero, before opening; otherwise, liquid will escape from jars. Complete the seal at once, and permit to cool as rapidly as possible, by setting jars far enough apart from each other to allow free air circulation among them.

Freezing Fruits and Vegetables

A concise source of information on preparation of fruits and vegetables for frozen-locker storage is Extension Bulletin No. 208 of the Michigan State College Extension Division, East Lansing, Michigan, entitled Preservation of Fruits and Vegetables in Refrigerated Food Lockers. In it are shown in tables or charts the most desirable varieties of the different kinds of fruits and vegetables for freezing, harvesting and handling instructions, preparation, sugar sirup concentration, dry sugar and dry pack methods for fruits, blanching time and packing directions for vegetables, and containers required.

In general, fruits and vegetables for freezing are harvested at the best stage for immediate use, are handled carefully to avoid bruising, and are prepared in the same manner as for cooking or canning. Vegetables must be handled rapidly for freezing, as for canning, to insure good quality. Sirups used for fruits are the same as for canning (Table III) and brines for vegetables contain 2 per cent. of sugar, or 1 teaspoonful to 1 quart of water.

Cleanliness is even more important in preparation for freezing than for canning, because the freezing process does not sterilize the product. Fruits are considered best when served just before they are completely thawed. If dry packed, they should be thawed in sugar sirup or with added sirup. All frozen vegetables should be cooked before they are eaten. They may be cooked after thawing, but may be started to cook while still frozen, especially if brine packed; if dry-packed, they may be plunged into boiling salted water.

TABLE V
Preparation of Fruits for Preserving in Frozen Lockers

Fruit	Preparation	Per Cent. Sugar Sirup (1) to cover	Dry Sugar or Dry Pack	Container (2)
Blueberries	Wash, drain, pack loosely in containers	40 or 50	Avoid dry sugar; may be frozen dry	
Blackberries Dewberries Boysenberries	Avoid unripe or overripe fruits; sort, wash, drain, pack loosely	45 or 50	For pastry 1 part sugar to 3 or 4 of berries	Air-tight for dry pack
Cherries, sour	Use only when fully ripe, wash, pit, and pack rapidly	60 (dry sugar preferred)	For pies, 1 part sugar to 4 of pitted cherries	Air-tight
Cherries, sweet (3)	Use red or black varieties, fully ripe, do not bruise. Stem, wash, drain, pack loosely. May be pitted	50	Not recommended unless pitted; 6-8 parts pitted to 1 part sugar	Air-tight
Peaches (3)	Harvest firm, ripe before fruit is over-soft.Avoid bruising. Peel by submerging in boiling water, plunging in cold water and rubbing peelings off.Remove pit,cut each half into 4-6-slices,pack rapidly,leaving little head space in container	40 or 50 Sirup must cover fruit.Seal quickly and rush to freezer to avoid browning	Not recommended	Must be air-tight
Rhubarb	Pack early in season; trim off leaves and bases of stalks; wash and cut into 1-inch pieces do not peel	50	May be dry packed without sugar	Air-tight
Red Raspberries	Harvest fully ripe berries when dry, in cool weather.Wash and drain thoroughly, do not crush in packing.Handle rapidly	40 Rush to Freezer	Not recommended	Air-tight
Black Raspberries	Same as red raspberries, but are seedy for dessert use		For use in pastry, 1 part sugar to 3 or 4 parts berries	

See page 13 for footnotes

TABLE V (Continued)

Preparation of Fruits for Preserving in Frozen Lockers

Fruit	Preparation	Per Cent. Sugar Sirup to cover (1)	Dry Sugar or Dry Pack	Container (2)
Strawberries	Use firm, red-ripe berries, hull, wash, drain thoroughly; pack whole, or slice 1/8 inch thick, or crush	40 or 50	Mix 1 part sugar to 4-6 parts berries. If whole fruits set over night in refrigerator	Air-tight

(1) Sugar sirup of percentage is indicated (see Table III) should cover fruit in container.

(2) Unless air-tight container is specified, containers need not be air-tight.

(3) Peaches may turn brown unless handled rapidly without bruising; light-colored sweet cherries are likely to turn brown.

TABLE VI

DIRECTIONS FOR PREPARING QUICK-FROZEN VEGETABLES

Vegetable	Varieties Preferred	Harvesting, Handling and Preparation	Blanching Time in Boiling Water(1)	Packing	Container (2)
Asparagus	Mary Washington	For tips, 4½" lengths; for cut 1" pieces. Avoid iron utensils. Wash thoroughly	minutes 2-3	2% brine or dry pack	Air-tight
Beans, Soup Green	Stringless green pod, Tendergreen Refugee, Kentucky Wonder	Avoid over-mature or small pods prepare for canning or cooking	minutes 2-3	2% brine or dry pack	Air-tight for dry pack
Wax	Round-pod Kidney, Brittle Wax Pencil Pod Black Wax				
Beans, Lima	Fordhook, King of the Garden, Burfee Bush, Early Baby Potato, Henderson	Harvest when beans are full size but before they have started to harden; shell by hand; pick out white beans. Handle rapidly	minutes 1½-2	Dry pack	
Broccoli	Italian Green Sprouting or Calabrese	Avoid yellow or tough heads; cut small pieces, using only tender stalks	minutes 3-4	2% brine or dry pack	Air-tight
Brussels Sprouts	Long Island Improved	Use only medium-sized sprouts; remove outer yellow leaves			

(1) If steamed, blanch 50 per cent. longer. Blanching should be done by dipping vegetables in a wire basket or colander, into a large volume of boiling water (about 3 gallons per pint of vegetable). As soon as the time is up, the blanched vegetables are plunged immediately into cold water.

(2) Unless air-tight container is specified, containers need not be air-tight.

TABLE VI (Continued)

DIRECTIONS FOR PREPARING QUICK-FROZEN VEGETABLES

Vegetable	Varieties Preferred	Harvesting, Handling and Preparation	Blanching Time in Boiling Water(1)	Packing	Container (2)
Cauliflower	Snowball Snowdrift	Avoid discolored or spreading heads; trim, cut into small pieces	minutes 2-3	2% brine	Air-tight
Corn, Sweet	Golden Cross Bantam, Golden Bantam	Harvest early in morning, in milk stage; husk, silk, and trim ears. Scald on cob 2-3½ minutes, cut from cob and pack	minutes 8-10 for corn on cob	Cut corn packed dry; corn on cob wrapped singly in moisture proof material	Air-tight
Peas	Thomas Laxton, Little Marvel, Asgrow 40, Alderman	Avoid over-mature pods; shell by hand, sort out over-mature and immature peas and foreign matter. Pack rapidly	minutes 1-1½	Dry pack	Air-tight
Spinach and Greens		Harvest as for table use, trim, wash thoroughly	minutes 2-2½	Usually dry pack	Air-tight

(1) If steamed, blanch 50 per cent. longer. Blanching should be done by dipping vegetables in a wire basket or colander into a large volume of boiling water (about 3 gallons per pint of vegetable). As soon as the time is up, the blanched vegetables are plunged immediately into cold water.

(2) Unless air-tight container is specified, containers need not be air-tight.

Drying and Dehydrating

Two excellent pamphlets on home drying and dehydrating or evaporation of fruits and vegetables are United States Department of Agriculture Farmers' Bulletin No. 1918 entitled "Drying Foods for Victory Meals", and Circular 619 (revised 1942), Preservation of Fruits and Vegetables by Commercial Dehydration, which may be obtained free from the Office of Information, United States Department of Agriculture, Washington, D. C., as long as the supply lasts, after which they can be purchased for 5 cents and 10 cents respectively, from the Superintendent of Documents, Government Printing Office, Washington, D. C. Also available from the Victory Garden Committee, State Council of Defense, Harrisburg Pa., is Popular Bulletin No. 1 of the Ellen H. Richards Institute, Pennsylvania State College entitled, "Home Dehydration and Wartime Conservation of Fruits and Vegetables".

Drying reduces vitamin C greatly and vitamin A to some extent; the losses depend a great deal upon preliminary treatment and the time required for drying. In general, preliminary treatment or preparation for drying is the same as for freezing, except that fruits are not sugared, and vegetables after blanching are drained and placed immediately upon trays and dried, rather than being dipped in cold water and drained as they are for freezing. Brief directions for preparing fruits and vegetables for evaporating are given in Table VII.

Dried vegetables and fruits should be stored in a dry, cool place in insect-proof containers. They should be restored by soaking in water for several hours or overnight, and cooked in the soaking water except in case of fruits used in pastries.

It should be emphasized that drying or dehydrating may change flavors, especially of crops such as greens, and that not all dried products are easily stored. Certain dried products such as cherries and carrots, take up moisture from the air and deteriorate, unless they are kept in a moisture-proof container. The acceptability of dried vegetables which are new to the family should be determined, before any considerable quantities of such vegetables are dried or evaporated.

TABLE VII

DIRECTIONS FOR DEHYDRATING FRUITS AND VEGETABLES

Product	Trimming, Etc.	Preliminary Treatment		Tray load Per Sq Ft Lb.	Maximum Drying Temperature Degrees F (3)	Average Drying Time, Hours	Dried Product	
		Type	Time Minutes				Characteristics	Percentage of Weights as Harvested
Apples	Peel,core,trim, cube or slice	Soak in salt (1) water	5	1½	140-160	6-10	Dry, springy	10-15
Apricots (5)	Wash,halve,stone	Soak in salt water	5	2	135-155	10-20	Dry, leathery	15-19
Berries	Wash,sort,drain	none	0	1	140-150	10-15	Dry but should not crumble	15-20
Cherries (5)	Wash,stem,pit large varieties	none	0	1	135-160	15-20	Slightly moist, sticky	18-30
Peaches	Halve,pit,peel	Soak in salt water	5	2½	145-155	15-24	Dry leathery	14-19
Pears	Peel,halve,core	Soak in salt water	5	2½	140-150	10-15	Dry leathery	12-17
Plums (large)	Halve, pit	Soak in salt water	5	2½	145-160	15-20	Dry leathery	18-24
Prunes	Wash,stem	none	0	3	145-160	15-20	Skin dry flesh moist	33-38
Beans, snap	Trim,wash,cut into 1-inch pieces	Steam (2)	15-20	3 4	140-155	8-12	Dry,tough to brittle	8-12

(1) Stir pieces in cold salt water having 6 teaspoons of salt to the gallon, to prevent browning during handling.

(2) Place in wire basket loosely, suspend in covered kettle or boiler in which one inch of water is boiling vigorously until all pieces are relaxed or heated through. Times shown are approximate to bring this about. After steaming, spread on trays immediately and begin to dry.

(3) Higher temperature is that at start of drying.

FOOTNOTES CONTINUED ON NEXT PAGE

TABLE VII (Continued)

DIRECTIONS FOR DEHYDRATING FRUITS AND VEGETABLES

Product	Trimming, Etc.	Preliminary Treatment		Tray Load Per Sq Ft Lb.	Maximum Drying Temperature Degrees F.	Average Drying Time, Hours	Dried Product	
		Type	Time Minutes				Characteristics	Percentage of Weights as Harvested
Carrots	Wash, scrape, trim, dice, or slice	Steam (2)	4-8	1½	150-160	8-12	Dry tough to brittle	8-12
Celery (4)	Trim, wash, slice or shred	Steam	1-2	1	135-145	8-10	Dry, tough	4-8
Celery leaves	Wash, trim	Steam	1-2	½	135-145	3-6	Dry, brittle	4-8
Corn, sweet	Husk, steam, cut from cob	Steam	15-20	1 3/4	150-165	5-10	Dry, brittle	8-12
Onions (4)	Trim, slice or shred	Steam	½-1½	1 1/4	140	5-10	Dry, crisp	10-14
Peas	Shell, clean	Boiling water	1-2	1	140-150	8-12	Dry, hard	9-14
Peas, sugar	Trim, wash, cut into 1-inch lengths	Steam	5-10	3/4	140-150	8-12	Dry, brittle	8-12
Spinach, greens	Trim, wash, drain	Steam	1	½	180	6-10	Dry, crisp	3-6
Tomatoes (4) (5)	Wash, scald, peel, core, slice	None or Steam	0-3	1 1/4	140-150	10-14	Dry, brittle	3-7

(2) Place in wire basket loosely, suspend in covered kettle or boiler in which one inch of water is boiling vigorously until all pieces are relaxed or heated through. Times shown are approximate to bring this about. After steaming, spread on trays immediately and begin to dry.

(4) These vegetables should be dried only for flavoring; to conserve best nutrient values, they should be preserved by other methods.

(5) Acid fruits should not be placed in contact with galvonized wire screen tray. Either wooden slat trays are used, or the wire screen may be covered with clean cheesecloth, paper towels, or brushed with melted paraffin, and prepared fruits laid upon these.

Brining and Fermenting Vegetables

Full information on brining and fermenting vegetables --chiefly cucumbers, though onions, cauliflower, green peppers, tomatoes, snap beans, beets, sweet corn, and cabbage are included-- is given in Farmers' Bulletin 1438 of the United States Department of Agriculture, entitled *Making Fermented Pickles*. Sauerkraut and best methods for preparing it from cabbage are described in Bulletin No. 595 of the New York State Agricultural Experiment Station, Geneva, New York, and also in Circular No. 35 of the United States Department of Agriculture, entitled, *The Commercial Production of Sauerkraut*, obtainable for 10 cents a copy from the Superintendent of Documents, Government Printing Office, Washington, D. C.

In making fermented pickles and sauerkraut, utmost care must be exerted in all steps of the process, and utmost cleanliness must prevail, if spoilage is to be avoided and a good product insured. Because the process is itself fermentation caused by bacteria, chances of spoilage through the action of undesirable bacteria, yeasts, or other fungi are considerable unless the proper conditions for the desired fermentation are maintained.

These conditions include (1) cleanliness, (2) proper preparation and trimming of the product, (3) proper salting or brining, (4) exclusion of air, and (5) maintenance of the proper temperature.

For *sauerkraut*, these conditions are met as follows:

(1) Use clean utensils - paraffined wooden barrels or kegs or stoneware crocks for fermentation vats, clean white muslin cloth to cover cabbage while fermenting, circular wooden or slate slabs just fitting inside the top of the vats, preferably stainless steel knives and cutters.

(2) Trim off outer leaves, quarter, remove cores or cut fine, and slice or shred so pieces are about the thickness of a dime or nickel.

(3) Mix not less than 2 nor more than 3, but *properly 2½ per cent*, of dry salt evenly with the shredded cabbage. This makes *4 ounces of salt to 10 lb. of cabbage*, or *one lb. of salt to 40 lb. of shredded cabbage*.

(4) Pack evenly in the vat, adding at most 5 pounds of cabbage and 2 ounces of salt at a time. Do not bruise nor crush, but press firmly enough to force out air. The salt will draw enough moisture from the cabbage that the brine will cover it. Cover with clean white muslin cloth, on which the wooden or slate cover is placed. Add a weight heavy enough to bring the brine formed by the cabbage juice and salt to the *bottom of the cover*. A convenient weight is a crock in which water can be poured to obtain the right pressure.

(5) Hold at a temperature between 70 and 86 degrees Fahrenheit. At the lowest temperature, fermentation will require a month, and at the highest, 10 days. The kraut produced at the highest temperature will be softer than that at the lower temperature.

When fermentation is completed in late fall, the kraut may be kept in the vat if it is stored in a very cool place, simply by skimming the surface occasionally and excluding insects, or by sealing the surface with hot paraffin poured around the cover. If sauerkraut is produced in summer, the easiest method of storage is to heat the kraut in its own juice to about 120° F., packing in glass jars, covering with juice, covering, cooking in boiling water for 15 to 20 minutes, and sealing.

Other vegetables which may be fermented in the same way are young and tender snap beans (without shredding), somewhat more mature snap beans if shredded, winter radishes, turnips, and rutabagas.

For cucumber pickles, the steps are the following:

(1) Use stoneware jars or paraffined wooden containers for fermentation, with wooden or slate slabs for covers, as for sauerkraut. Omit muslin cloth.

(2) Use pickling varieties preferably (National Pickling, Chicago Pickling, Boston Pickling, Snow's Perfection) though any variety can be pickled. Wash, trim to about 1/4 to 1/8 of the stem; do not bruise.

(3) Pack cucumbers in jar or barrel. In small lots use 6 quarts of 10 per cent. salt brine, (containing 22½ ounces of salt to 6 quarts of brine)to a 4-gallon jar; in larger containers, use 5-6 inches of 10 per cent. brine in the bottom, with a quart of good vinegar, and pack cucumbers into the brine. In either case, fill the container to a point near the top, and weight the cover sufficiently to hold the cucumbers well below the surface of the brine. Not more than a day later, add 1 pound of salt to each 10 pounds of cucumbers, placing this in the brine above the cover, so that it dissolves evenly throughout instead of settling to the bottom. This is necessary to keep up the strength of the brine. At the end of each week thereafter for 5 or 6 weeks, add 1 ounce of salt for each gallon of pickles, placing it on the cover as before.

(4) Adjust weight or cover so that brine remains always above it. From time to time, remove scum that forms.

(5) Keep temperature as nearly up to 86° F. as possible, especially at the beginning of fermentation. When all of the pickles have changed in color from pale green to dark or olive green, and all of the flesh is translucent and firm, fermentation is complete. This

requires from 6 to 8 weeks.

The fermented pickles are preserved, after soaking to remove excess salt in water at 120° F. for 10-12 hours, as sour or sweet pickles, mixed pickles, or pickle relish.

For sour pickles, they are removed after soaking, drained, and covered with vinegar, either in stone jars, glass jars, or kegs and barrels for larger quantities.

For sweet pickles, they are covered with vinegar containing 4 pound of sugar per gallon, usually after first soaking for about a week in plain vinegar. Spices are added, and more sugar later, if desired.

Dill pickles are fermented rapidly in 5 per cent. brine with added dill herb and other spices. The brine contains 1 pound salt and 1 pint vinegar to 2 gallons of water. At the end of 10 to 14 days' fermentation, the pickles are canned by packing in jars with added dill and spice, covered with brine which has been heated to boiling and cooled to 160° F., then sealed.

Home Storage of Fruits and Vegetables

Crops which mature in the late fall, especially if their rate of development is relatively slow, can be stored raw or fresh for periods ranging from several weeks to four to five months. Storage may be out-of-doors, with more or less protection for certain crops; in a cold cellar or cave for other crops; and in an unheated room or attic of the house for others.

Outdoor Storage - For outdoor storage, the soil is the refrigerating and humidity-controlling agent; vegetables or fruits are kept cool and moist by being protected with the soil. Some vegetables, notably parsnips and salsify or oyster plant may be left standing during the winter where they grew, and harvested when the ground is thawed. Others, less hardy, are placed in trenches, mounds or pits, covered with straw or leaves to keep them clean and to insulate them somewhat, and the straw in turn is covered with sufficient soil to exclude frost from the stored produce. Barrels partly sunk in a slanting position in the soil and covered with straw and soil, or banked coldframes covered with a screen which in turn is covered with straw or leaves also may be considered as outdoor storages.

Trenches, often used for storing celery, Chinese cabbage, endive, or cabbage, are dug on a slight knoll to avoid the entrance of surface water, about two feet wide and 10 or 12 inches deep. Plants are set with their roots untrimmed, in moist soil at the bottom of the trench. They are protected by covering the trench with boards nailed together to form an inverted trough. When freezing weather is anticipated, the edges of the boards are covered with soil, and straw, leaves, or cornstalks are piled upon the boards. Soil is banked upon the straw, to a depth of 10 or 12 inches, and this in turn is insulated with a covering of cornstalks, straw, or strawy manure after it is frozen.

Barrels to be used as storages are sunk in a slanting position, covered with straw or leaves, and these in turn with soil sufficient to exclude frost. The open end of the barrel, which extends just above the surface of the ground, is covered with a closely fitting wooden lid, and this is covered with a large bag of straw or leaves. If fruits or vegetables containing seeds are placed in the barrel, it must be rodent-proof. The advantage of barrels as storages is that they permit more ready access than other outdoor storages.

Pits or Mounds are used for outdoor storage of larger quantities of produce than might be placed in barrels or coldframes. They are constructed by leveling an area four or five feet wide and as long as necessary to include the produce to be stored. This area is covered with four or five inches of straw or leaves, and the vegetables are piled in a mound thereupon. These in turn are covered with leaves or straw, a layer of soil 10 to 12 inches deep, and an outer, insulating layer of straw, cornstalks, or strawy manure after the ground is frozen. Root crops, cabbage, potatoes, and apples may be stored successfully in this manner.

Cellars and Caves for storage should be well insulated against frost, either by being sufficiently underground or by being banked with insulating materials such as those mentioned above. They should have earth floors to maintain sufficient humidity, and should have doors, windows, or other fairly large ventilators which may be opened and closed at will. Proper storage conditions are maintained in them by ventilating in the colder parts of the day if the weather is mild, or in the warmer parts if it is very cold. Humidity in cellars and caves may be raised by sprinkling the earth floors from time to time; if roots or leaf crops requiring high humidity are stored with other products requiring lower humidity, the roots may be covered with damp sand.

Practically all of the fruits and vegetables suitable for winter storage may be kept in cellars or caves, except onions, sweet potatoes, pumpkins, and squashes. These may be kept better in a cool, dry room, as may winter pears.

Where storage conditions are subject to control, the best conditions for storing common fruits and vegetables are those shown in Table VIII. Ventilation is important in all storages.

For further information, send to the Office of Information, United States Department of Agriculture, Washington, D. C. for Farmers' Bulletin No. 879, Home Storage of Vegetables, and for United States Department of Agriculture Circular No. 278 (revised 1938), The Commercial Storage of Fruits, Vegetables, and Florists' Stocks; also, consult your County Agricultural Extension Representative for timely information from the Agricultural Extension Service of The Pennsylvania State College.

TABLE VIII

BEST STORAGE CONDITIONS FOR FRUITS AND VEGETABLES

Fruit or Vegetable	Temperature Degrees Fahrenheit	Moisture (Relative Humidity)	Period of Storage	Preparation and Special Measures
	Medium Temperature			
Pumpkin Squash	50-55	Dry (70-75)	2-6 months	Only sound fruits free from injury.Place on shelves, 1 to 4 deep, depending upon size. Handle very carefully.Do not remove stems.
Sweet Potato	50-55	Medium (80-90)	4-6 months	Dig before killing frost.Cure at 80-90°F. for 10 days with ample ventilation, and store in same crate in which harvested.
Tomato, Green	55-70	Medium (85-90)	2-6 weeks	Only sound,fully grown fruits.Rate of ripening slower at lower temperature.No advantage in leaving on plants and hanging in storage.
	Cool Temperature			
Pepper, sweet (Mango)	32-50	Medium (85-90)	4-6 weeks	Pitting may occur in green fruits at lower temperature. Plants may be hung in storage.
Potato	36-50	Medium (85-90)	3-6 months	Sweetening occurs at temperatures below 40° F. but can be removed in a week or two at 60-70°; potatoes remain without sprouts longest at low temperature.Moderate sprouting does no harm.
Tomato, ripe	40-50	Medium (85-90)	10 days	Store in shallow tray, or 1 layer deep.
	Cold Temperature			
Apple	31-32	Medium (85-88)	2-6 Months	Pack in baskets or crates with shredded paper to prevent scald. Length of storage depends upon variety.
Beet and Carrot	32	Moist (90-95)	1-3 months	Remove tops; store in baskets or slatted crates In medium humidity cover with moist sand.
Brussels Sprouts Kale	31-32	Moist (95)	2-3 months	Leave in garden until freezing weather; set whole plants with roots in damp soil.

TABLE VIII (Continued)

BEST STORAGE CONDITIONS FOR FRUITS AND VEGETABLES

Fruit or Vegetable	Temperature Degrees Fahrenheit	Moisture (Relative Humidity)	Period of Storage	Preparation and Special Measures
	Cold Temperature			
Cabbage	32	Moist (90-95)	3-4 months	Leave a few wrapper leaves about head.
Celery, Chinese Cabbage, Endive	31-32	Moist (95)	2-4 months	Keep roots moist by setting in moist soil. Do not wet leaves in storage.
Grape	31-32	Medium (80-85)	3-4 weeks	Pick during fair weather, not soon after rain.
Horse-radish	32	Moist (90-95)	4-6 months	May be left in ground over winter. Handle same as other roots in storage.
Leek, green	32	Medium (85-90)	1-3 months	Handle same as celery.
Onion	32	Dry (70-75)	5-6 months	If frozen, allow to thaw slowly without handling.
Parsnip and Salsify	32	Moist (90-95)	2-4 months	May be left in ground over winter.
Pear, winter	29-31	Medium (85-90)	2-6 months	Length of storage depends upon variety. Handle same as apples.
Quince	31-32	Medium (80-85)	3-4 months	Pack in baskets or crates.
Winter Radish, Rutabaga, Turnip	32	Moist (90-95)	2-4 months	Handle as other roots. Shriveling may be prevented by dipping in melted paraffin. Skin must be dry for this treatment.

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